

# **Is One Plus One Always Two? Insuring Longevity Risk While Having Multiple Savings**

## **Accounts\***

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### **ABSTRACT**

We investigate the possible consequences of having multiple savings accounts for payout decisions at retirement. Using proprietary data of 15,293 retirees' annuitization decisions, we find that retirees with smaller accounts have significantly higher propensity to cash out their accounts upon retirement. This has ALM implications. Our identification strategy reveals that our findings are driven from holding multiple accounts. An internet experimental survey with a large representative sample and a laboratory experiment both confirm these empirical results and suggest that the composition of multiple accounts affects the annuitization rates of the total savings portfolio mainly at the tails of the distributions.

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We investigate the possible consequences of having multiple savings accounts for payout decisions at retirement. Using proprietary data of 15,293 retirees' annuitization decisions, we find that retirees with smaller accounts have significantly higher propensity to cash out their accounts upon retirement. This has ALM implications. Our identification strategy reveals that our findings are driven from holding multiple accounts. An Internet experimental survey with a large representative sample and a laboratory experiment both confirm these empirical results and suggest that the composition of multiple accounts affects the annuitization rates of the total savings portfolio mainly at the tails of the distributions.

*Keywords:* Asset Liability Management (ALM), Mental Accounting, Annuitization

## 1. Introduction

Individuals at retirement need to decide how to withdraw their savings. How much of it to invest in an annuity (insuring you against longevity risk) and how much to cash out as a lump sum. Their goals are to avoid exhausting their assets too soon, and to be able to face potential future liquidity shocks. This intricate decision made by individuals at an older age can have significant consequences on their well-being (e.g. Mitchell et al. 1999; Brown et al. 2001). Given both its complexity and importance, there is growing academic and practical interest in the household financial literature aimed at enhancing both long-term savings and demand for longevity insurance products (e.g. Benartzi, Previtro and Thaler 2011, among others).

Many individuals saved for retirement via different products and providers. Will the distribution of these funds according to the size of the accounts affect the annuitization decision of the various accounts? If one is rational, and there are no frictions, it is expected that one will allocate the accumulated savings between an annuity and a lump sum according to the financial needs, and regardless of the sizes of the different accounts. Given the dynamic job market and the fact that most individuals will save for retirement via different products and accounts (a result of changing jobs, unemployment, or preferences), there is a clear need to better understand how having multiple accounts can influence not only savings and asset allocation decisions, but also the decision on how to withdraw the funds. Yet, there is relatively little empirical evidence on this issue.

Annuitization decisions are also related to the investment strategy of insurance companies. Long-term savings institutions in many countries provide longevity insurance to those clients who annuitize their funds at retirement (e.g., Switzerland and Israel). Hence, a better understanding of the relation between the distribution of multiple savings accounts of different individuals and the

related annuitization decision could be of great importance to the asset liability management (ALM) and reserve management.

In this paper, we investigate whether the distribution of pension savings across various providers, as well as the relative size of each specific account managed by a long-term-savings provider, shape retirees' decisions to annuitize or cash out at retirement. Our empirical investigation relies on a unique and very detailed proprietary data set from a leading insurance company in Israel, which includes information regarding the annuitization decisions of retirees, as well as a rich set of parameters describing these individuals.<sup>1</sup> Our sample consists of 15,293 retirees' choices during the years 2009–2013. We document a correlation between the size of the accumulated funds and the decision to annuitize. In particular, retirees with small accounts were much more likely to elect the (full) lump-sum option.<sup>2</sup> To ensure that our results are not driven by accounts with very small, relatively negligible amounts, we also examine retirees who had accumulated over NIS<sup>3</sup> 50,000 in a single account with this insurance company.<sup>4</sup> Even for this subsample of 8,759 individuals, our results hold true. Retirees with smaller accounts were far more likely to choose the (full) lump-sum option, while those with larger amounts were more likely to annuitize.

The fact that annuitization rates differ according to account size is puzzling. In Israel (as in other countries), it is very common for employees to have several long-term savings accounts and products. Hence, any given small account can be either the worker's main savings account, or

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<sup>1</sup> Each client in our sample could choose to withdraw a lump sum, an annuity, or both, subject to Israeli government regulation. The annuitization decision is made by each retiree only once.

<sup>2</sup> We consulted with long term savings tax experts to make sure that tax considerations should not derive these results

<sup>3</sup> New Israeli shekels.

<sup>4</sup> This threshold was set in consultation with financial industry experts in Israel.

it could be part of a larger diversified portfolio<sup>5</sup> of products or providers. Our data are obtained from a single large Israeli insurance company. One challenge that this dataset imposes is the ability to determine which individuals sampled have additional accounts with other insurance companies or pension providers. Hence, the relation between the holder's account size and the documented annuitization decision can result from (1) different preferences for annuities by individuals with different total savings amounts, or (2) different preferences that are driven by the distribution of funds over several accounts, or both. In the latter case, cashing out (annuitizing) the accumulations from small (or large) accounts may be an indication of a well-known behavioral bias known as mental accounting (Thaler, 1985). Mental accounting can cause retirees to perceive smaller and larger pension accounts differently, affecting their decisions about disbursements.

To further investigate this phenomenon and to distinguish between these possible explanations, we employ a multi-step identification strategy. First, we use information about occupation. Given that the dataset contains occupation information for each individual,<sup>6</sup> we screen the sample according to very high versus very low expected income occupations. Given how labor agreements work in Israel, individuals save a constant percentage of their wages in a long-term saving product. Hence our assumption is that high expected income observations should be associated with higher total long-term savings (which may be divided across providers or products). Accordingly, individuals with high expected income in our sample having a small account suggests that this account is likely to be merely a part of their diversified portfolio. Conversely, very low expected income observations are anticipated to be associated with lower

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<sup>5</sup> A pension portfolio would consist mostly of financial assets. Reverse mortgages are very rare in Israel.

<sup>6</sup> Individuals have the incentive to report changes in their occupational status, since otherwise they might not be covered by other insurance policies from this company or might have to pay a premium on other products.

overall savings. Our results suggest that while high-expected-income individuals are indeed more likely to annuitize, they are less likely to annuitize small amounts.

Second, to mitigate the potential concern of annuity choices being influenced by differences in individual characteristics or a selection bias, we also use propensity score matching on socioeconomic attributes (the only difference being the amount accumulated) to pair selected individuals. Again, the smaller accounts have a higher propensity to be distributed as lump sums. Individuals do not treat small and large accounts similarly.

To further study the overall effect on the entire portfolio and to provide additional robustness to our previous results obtained from the data, we conducted three tests: 1) an Internet experimental survey, 2) an incentivized experiment in the laboratory, and finally, 3) an experimental survey of financial experts.<sup>7</sup> The experimental framework not only allows us to overcome some of the data limitations (specifically the lack of information regarding savers' entire portfolios), but it also enables us to elicit preferences for annuitization in various controlled allocations of the accumulated funds. Furthermore, it enables us to examine the choice in an environment free of logistical frictions that could exist in the real world.

In the Internet experimental survey, we randomized the size distribution of the accounts. The participants were asked to divide a total sum of money that was saved for retirement between a monthly annuity and a lump sum. A total of 1,971 participants (from a representative sample of the Israeli population) were randomly assigned to one of five conditions. In the first condition, the respondents were asked to split their (virtual) accumulated funds (of NIS 2,000,000) between an annuity and a lump sum (one account that serves as the control condition). In the other four

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<sup>7</sup> There is a growing use of several experimental methods aimed to investigate a particular research project. For an additional discussion on the pros and cons of using internet experiment versus lab experiment and the benefits of using several experimental methods for robustness and further insights, see for example Dohmen et al. (2011); Glaser et al. (2019); Hurwitz et al. (2020); and Ben-David and Sade (2020).

conditions, participants were required to perform a similar task, only now their funds were split between two accounts (totaling NIS 2,000,000 in the various conditions): a small account of NIS 30,000 and a large account of NIS 1,970,000 (condition 2); a small account of NIS 100,000 and a large account of NIS 1,900,000 (condition 3); a small account of NIS 500,000 and a large account of 1,500,000 (condition 4); and two equal accounts worth NIS 1,000,000 each (condition 5). If individuals are rational, since there are no frictions in our experiment, they should treat all five conditions in a similar manner and divide the total NIS 2,000,000 between an annuity and a lump sum only according to their preferences, regardless of how the amount is initially allocated across the different accounts.

Our results indicate that regardless of condition (distribution of funds across accounts) or size, participants elected to withdraw about one-third of their larger accounts as a lump sum, implying a preference for the annuity option<sup>8</sup> (a result that is similar to actual annuity take-ups in Israel; Hurwitz and Sade 2019). However, small accounts are significantly more likely to be withdrawn as lump sums. Moreover, the smaller the amount, the more likely the subject was to choose the cash option.<sup>9</sup>

Our analysis of the distribution of the withdrawal strategy for the total accumulated amounts (i.e., NIS 2,000,000 for all participants, regardless of the condition) suggests that the distribution of the accounts does matter. We use a non-parametric approach to test whether the observed distributions of annuity choices of the total amount in the control condition (with one account) and each of the other treatments (two-account conditions) comes from the same

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<sup>8</sup> The median lump-sum proportion is even smaller (about 10–20%).

<sup>9</sup> For the NIS 30,000 accounts, we document an average lump-sum withdrawal of 71.2% (median of 100%), for the NIS 100,000 accounts, an average of 57.6% (median of 60%), for the NIS 500,000 accounts, an average of 43.6% (median of 30%), and for the equal accounts, 37.9% (median of 20%). Consistent with that, we find a higher tendency to withdraw the full amount as a lump sum in the small accounts than in the larger accounts and vice versa for the annuity.

population distribution. A Kolmogorov–Smirnov test rejects this null hypothesis. We provide further evidence that the differences arise from the tails of the distribution. In particular, there are differences in the tendency to withdraw all the amount as a lump-sum as well as the tendency to withdraw all the savings as an annuity.

For robustness, we also conducted two treatments of the survey (the one account treatment and two accounts treatment with NIS 1,900,000 and NIS 100,000 respectively) with financial professionals well-trained in thinking about such problems (executives at an insurance company and finance professors). In this experiment, we did not find a significant difference between the two conditions.<sup>10</sup>

Next, we implemented an incentivized laboratory experiment. Its advantages over the Internet experimental survey include the ability (1) to better control the information conditions<sup>11</sup> and the exogenous stochastic processes, specifically regarding the effects of anticipated consumption (i.e., future financial need) and expected longevity on the annuitization choices and possible unknown parameters such as the spouse savings; (2) to validate some of the previous Internet experimental survey results using a different set of participants; (3) to repeat the task for the same participant, which allows us to include possible learning effects; and (4) to offer monetary rewards related to performance to create a more authentic decision-making environment. (5) To focus on the pure effect of the annuitization decision. Given that the life cycle saving decision may be prone to biases as well (e.g. Shefrin and Thaler 1988, Statman 2017(b)), our experimental framework also allows us to control for the first stage of the financial decision (the savings phase)

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<sup>10</sup> Our project joins the line of financial economics research that uses financial professionals as either for robustness tests or for the main subject pool in surveys (e.g. Anderson and Sunder (1995); Heuer et al. (2017), and Holzmeister et al. (2020)) and experiments (e.g. Sade et al. 2006, and Weitzel et al. (2019)).

<sup>11</sup> For instance, we do not have information about the behavior of spouses and individuals in the same household in our data. A controlled laboratory experiment enables us to control for these exogenous properties.



and thus to capture and to investigate the pure effect of holding multiple accounts on annuitization choices.

Our laboratory experimental results support both our hypothesis, as well as the results from the Internet experimental surveys by showing that small accounts are more likely to be cashed out in all settings. Regarding the total amount, we find that the propensity to cash out when participants had one account of NIS 2,000,000 (condition 1) is an average of 41%, whereas the propensity to cash out from the small and large accounts together when participants had two accounts of 100,000 and 1,900,000 respectively (condition 3) is 17.5%. In sum, our experimental findings suggest that mental accounting does indeed play a role in retirement payout choices.

Our work is directly related to several literatures including long-term savings, reserve management and ALM<sup>12</sup>, the annuity puzzle, and mental accounting, which we elaborate on in the literature section below. While we use unique data from Israel to conduct our empirical investigation, clearly the issue of multiple savings accounts and its effect on annuitization decisions is not unique to Israel. Hence, our conclusion, that the composition of saving accounts matters both to individuals and to the insurance companies, can be generalized to other economies.

This paper is structured as follows: we first describe previous related literature, followed by a review of the setting in which our investigation takes place. We then present the data and report the empirical results of our analyses followed by a description of an additional Internet experimental survey using a representative sample of the population and a robustness test consisting of financial professionals. Thereafter, we present a laboratory experimental design

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<sup>12</sup> Asset and liability management is the practice of financial risks management that occur to mismatches between assets and liabilities of a corporation.

aimed to check the robustness of our survey experimental results. We conclude with a brief discussion of the consequences of diversification in the context of the annuitization decision.

## **2. Related Literature**

### **2.1 ALM strategies of long term saving providers**

Prior studies have emphasized the complexity of the ALM strategies of long-term-savings providers. When the institution that manages the long term savings plan is also required to pay either an annuity or lump sum depending on its client's choice upon retirement, its management faces many dilemmas when making decisions related to ALM and the required reserve management. This affects investment and indexation policy. The academic literature focuses on different issues that affects ALM of long-term saving managers. Actuarial considerations such as retirement age, job discharges, and mortality rates can influence the length of the future cash flow series (Bauer et al. 2006). Furthermore, annuity purchase assumptions are also part of the calculation process (Blome et al. 2008). We add to this literature by testing if the composition of the managed accounts (in terms of size) should also be considered.

### **2.2 Annuitization choices**

Yaari (1965) was the first to note that a rational retiree with no bequest preferences in a world of fairly priced annuities will gain more from purchasing said annuities, compared to withdrawing a lump sum. Yet recent studies in several countries allude to an annuity puzzle, where little evidence is found that retirees follow this advice (e.g., Beshears et al. 2014; Ganegoda and Bateman 2008). While there are studies that attempt to explain this annuity puzzle with market imperfection and product feature arguments, there is a growing body of literature that focuses on customer characteristics and attitudes (socioeconomic or behavioral). Examples of explanations include the complexity of the decision (Brown et al. 2013; Brown et al. 2017), default biases

(Agnew et al. 2008; Büttler and Teppa 2007), difficulty in making irreversible decisions (Brown and Warshawsky 2001), biases related to framing (Benartzi et al. 2011; Beshears et al. 2014; Goldstein et al. 2016), difficulty parting with accumulated money (Benartzi et al. 2011), availability errors (Hu and Scott 2007), ambiguity about life expectancy (Smith et al. 2001), and the belief that annuities have a “smell of death” (Statman 2017). While we do not aim to solve the annuity puzzle in this current work, we hypothesize that saving via multiple accounts can influence the annuitization choice. Hence, the annuity puzzle is an additional parameter for insurance companies, decision makers, and regulators to consider.

### **2.3 Mental accounting and annuitization**

Mental accounting (Thaler 1985) suggests that individuals use a set of cognitive actions when they perform financial activities. The theory is based on the notion that people tend to treat financial outcomes in different ways related to distinct decision heuristics and biases (Thaler 1985). Much attention in the literature has been given to three components of mental accounting (Thaler 1999): (1) how outcomes are perceived and evaluated (particularly for risky outcomes), (2) how activities are assigned to specific mental accounts, and (3) how frequently accounts are re-evaluated.

Past studies suggest that both sources and uses of funds are labeled in the mental accounting system. With regard to spending, the assignment of expenditures to various accounts supports making rational trade-offs and can act as a self-control device (Thaler 1999). Specifically, Shefrin and Thaler (1988) suggest that accounts are rated by households according to how tempting it is to spend them; hence, they predict that transferring funds to less tempting mental accounts could help households save more. We aim to expand this prediction by testing whether holding multiple savings accounts where at least one account is small (meaning the distribution of funds across

savings accounts in unequal), affects annuitization rates, as individuals will treat the accounts with unequal sizes differently.

Findings from the academic literature demonstrate that people treat small gains (relative to income) differently from large gains. Thaler (1990) suggests that, in contrast to larger gains, smaller gains are coded as current income and hence spent rather than saved. Loewenstein and Thaler (1989) further determine that subjective discount rates for small amounts are high compared to discount rates for larger amounts. Though it has already been suggested that mental accounting influences annuitization decisions, it has been with respect to different contexts. Benartzi et al. (2011) argue that economists mostly view annuitization as longevity insurance, but many consumers do not. Rather, consumers regard annuities as a “gamble” on whether they will live long enough for it to be paid out in full, and not as insurance against longevity. Brown et al. (2008) suggest that annuitization choices are influenced by a mental separation of investment choices from consumption choices. Hu and Scott (2007) illustrate that an annuity may be segregated into its own mental account rather than integrated with all retirement consumption funds. We intend to add to this literature by studying the potential effect of different account-size compositions of retirement portfolios resulting from saving via multiple accounts.

#### **2.4 The size of the savings accounts and annuitization choices**

Past studies demonstrated size effect on the decision to annuitize. Büttler and Teppa (2007) use data of individuals collected from 10 Swiss pension funds to investigate withdrawal decisions. They find that small accumulations are more likely to be withdrawn as lump sums, yet the authors relate their findings to income. A similar result is presented by Benartzi et al. (2011) in a paper investigating annuitization puzzles: the authors suggest that people consider small accumulations to be insufficient to annuitize. We aim to add to these existing findings by studying the effect of

the multiple accounts above and beyond income, and by testing if the distribution of funds across accounts has an effect on the entire pension portfolio.

### **3. The Setting: Structure of the Israeli Pension System**

The Israeli pension system is comprised of a public and a private layer. The private layer consists of five types of long-term-savings products: (a) “old” pension funds,<sup>13</sup> (b) “new” pension funds,<sup>14</sup> (c) “new” general pension funds, (d) pension insurance policies,<sup>15</sup> and (e) provident funds.<sup>16</sup> The focus of this project is on choices in the private layer that is related to pension insurance policies.<sup>17</sup> These products, some of which provide the saver with tax benefits, and many of which are part of common compensation agreements, are managed by insurance companies that provide both operational management and investment of the funds. Typically, in Israel, the institution managing the funds during the saving phase will also provide an annuity upon retirement.

Due to historical differences in tax incentives, employees have tended to save using either a pension fund or a pension insurance policy (these policies were usually offered to higher wage employees), whereas self-employed individuals routinely saved using provident funds or life insurance policies. Moreover, the choice of savings products differed across industries and was influenced by whether one belonged to an employee organization.

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<sup>13</sup> Defined benefit pension funds in Israel that were closed to new clients after December 31, 1994.

<sup>14</sup> Defined contribution pension funds that were first established on January 1, 1995; these funds must preserve actuarial balance.

<sup>15</sup> Also known in Israel as managerial insurance policies, the trade name of pension insurance products designed for employees. These policies include both a savings component and an insurance component (for different kinds of risks such as death and disability).

<sup>16</sup> For further discussion about the Israeli pension system see also Hurwitz (2018). Israel also provides public health system and national insurance health system.

<sup>17</sup> It is important to note that a state pension in Israel (social security) is historically very low and consists of a universal state pension (for individuals working at least a certain number of years); the private layer is the significant part of the pension and is state supported but privately funded (Gal, 2002).

Israel is an interesting setting to study because individuals can and do diversify their long-term savings through several plans and products. This can be done simultaneously or over time, actively or passively. For example, one might experience a change in the menu of available long-term-savings products following a change in one's workplace if the new employer has associations with different providers. Hence, a typical retiree who changes jobs every few years will most likely have more than one pension (or insurance policy) account.

Since 2000, pension insurance policies in Israel have been divided into two categories: those designated for an annuity, and those designated for a lump sum. Prior to 2008, lump-sum accounts allowed a lump-sum payment according to then-current law;<sup>18</sup> since 2008, such policies have allowed a lump-sum payment only for individuals who have saved a sufficient amount of money to be able to withdraw a minimum annuity as set by the revised law (this legislation only applies to funds saved after 2008).

#### **4. The Data**

We obtained proprietary data from a large insurance company in Israel regarding retirees with pension insurance policies.<sup>19</sup> Our dataset contains information on 15,293 retirees' withdrawal schemes between the years 2009 and 2013.<sup>20</sup> The amount of accumulated funds varies widely: the mean accumulation is NIS 173,000<sup>21</sup> and the median is NIS 65,000, with a minimum of NIS 1 and

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<sup>18</sup> The law changed in 2005, after which one could withdraw a lump sum only after the age of 60 years, whereas previously it could be withdrawn even at a younger age if other criteria set by the law were satisfied.

<sup>19</sup> The insurance company that provided us with the data is one of the five largest insurance groups in the country. The population that is insured in this company is very diversified in terms of occupation.

<sup>20</sup> We initially received information on 18,860 retirees but for some observations we did not have sufficient sociodemographic information (missing data).

<sup>21</sup> Approximately USD 50,000. This amount is lower than the average saving accounts in Israel. For instance, public data published by Old Mivtachim (the largest Israeli "old pension fund" which its members were likely to have other pension accounts for historical reasons), the average accumulation for clients between the ages of 60 and 64 years is NIS 728,000

a maximum of NIS 12,900,000.<sup>22</sup> The 75th percentile of the accumulated accounts is NIS 188,000. Because of the historical environment of long-term savings in Israel (in which many employers choose a default pension fund for their employees), it is very likely that small pension accumulations are merely a part of an individual's pension portfolio, while larger accounts are likely to be the individual's significant pension account.<sup>23</sup> Fig. 1 shows the distribution of client-level accumulations: the number of clients in our sample declines with the increase in accumulated funds.

### [FIGURE 1]

The dataset contains socioeconomic and demographic information for each retiree including date of birth, date of purchase of the policy, date of disbursement, gender, marital status, smoking status, annuity factor (price of the annuity generally specified in terms of either years or months of annuity to be paid out of a certain lump-sum amount), investment management method, medical and professional supplements to the policies, residence, last occupation, and other insurance tariff surcharges (risk, work disability, long-term-care insurance, and health insurance). The mean retirement age is 65.9 years, and 48% of the retirees are male; the majority of retirees are married (57.1%). At retirement, each client could choose a withdrawal of a lump sum, an annuity, or both, subject to the minimal mandatory annuity law (applying only to funds accumulated after 2008<sup>24</sup>). In all, 26.7% chose to annuitize at least some of their accumulated

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<sup>22</sup> The four largest accumulations were NIS 5.4 million, NIS 6.5 million, NIS 9.5 million, and NIS 12.9 million.

<sup>23</sup> We compared our data to public information published by Old Mivtachim, the largest Israeli "old pension fund" (historically, members of these funds usually did not change employers frequently and hence they did not have other pension accounts). The average accumulation for clients between the ages of 60 and 64 years was NIS 728,000.

<sup>24</sup> There is no default option for pension products analyzed in this paper (pension insurance policies). For further discussion about the Israeli annuitization legislation, see Hurwitz et al. (2019).

funds, and 73.4% chose not to annuitize any amount of the accumulated funds. The mean monthly annuity for those who annuitized is NIS 1,902.5 and the annuity factor is 13.5<sup>25</sup> (see Table 1).

[TABLE 1]

**5. Do People Annuitize Regardless of Their Total Accumulated Funds?**

**5.1. Diversification and Annuitization Decisions**

Diversification—usually referred to as portfolio selection (Markowitz 1952)—is common advice given to investors. This advice is applicable not only to individuals managing their own financial assets and portfolios, but also to long-term-savings money managers and product providers, mainly because diversification in their investment philosophies and strategies potentially provides access to different non-tradable financial assets. Clearly, the money manager's solvency can be an issue as well. As indicated above, for structural and historical reasons, pension savings in Israel are likely to be split between several pension funds and insurance companies. As a result of this diversification strategy, it may turn out that some individuals hold multiple savings accounts and have relatively small amounts managed by some long-term-savings money managers.

Mental accounting theory suggests that people treat small amounts and gains differently from large amounts. Hence, it is of interest to test if this affects retirees' withdrawal choices. In other words, we are interested in testing the hypothesis that diversification leading to multiple savings accounts will, in turn, cause individuals to treat small and large pension accounts differently when making their annuitization decisions.

**5.2. Annuitization Decisions: The Empirical Investigation**

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<sup>25</sup> In yearly terms; this equals 161.6 in monthly terms.



While the focus of our investigation is to learn if the distribution of funds across accounts<sup>26</sup> predicts the annuitization decision, it is important to control for all other relevant information. Hence, we conduct a series of descriptive regressions to examine the characteristics of retirees who choose to annuitize. Our main controls are based on past findings and can be divided into three main groups: personal (e.g., Bütler and Teppa 2007; Warner and Pleeter 2001), pension policy, and year-fixed effects.

### **Choosing an Annuity**

In our first examination, we investigate the proportion of retirees who choose to annuitize any portion of their accumulated funds. Fig. 2 presents this proportion for individuals with accumulations below and above the median amount in our data. We document a significantly higher proportion of decisions to annuitize among individuals with accumulated funds that are above the median. This result is consistent with findings for individuals invested in 10 different Swiss pension funds (Bütler and Teppa 2007). Small accumulations are more likely to be withdrawn as lump sums.

### **[FIGURE 2]**

Next, we conduct a logistic regression analyses to examine the characteristics of retirees who choose to annuitize. Specifically, we are interested in the effect of the size of accumulated funds on the propensity to annuitize (hence our main variable of interest is the total saved amount). In Equation 1 we estimate the effect of the total amount saved with this specific pension provider on the decision to annuitize.

(1)

$$y_{\text{ann}_i} = \alpha + \beta_1 \text{male}_i + \beta_2 \text{retirement age}_i + \beta_3 \text{year dummies}'_i + \beta_4 \text{total amount}_i$$

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<sup>26</sup>. We looked at the total sum of money in all funds together.

$$+\beta_5 \text{marital status dummies}'_i + \beta_6 \text{purchase age}_i + \beta_7 \text{no. of policies}_i + \beta_{11} \text{percentage 2008}_i + \epsilon_i$$

where  $y_{\text{ann}}$  is a dummy variable for choosing to annuitize ( $y_{\text{ann}i} = 1$  if the retiree annuitizes any portion of his accumulation);<sup>27</sup> retirement age is the retiree's age at the time of decision; year dummies are dummy variables for the years 2009–2012, indicating the year in which the retiree made the annuitization choice as defined above (2013 was the reference year); total amount is the total sum the individual accumulated upon retirement and is the main variable of interest; Marital status dummies includes - divorced, widowed, married, and unknown marital status (the category “single” is the reference); purchase age is the average age of the retiree (over all of the retiree's policies) when the policies were purchased (this variable is correlated with the client annuity conversion factor<sup>28</sup> and hence can serve as a proxy for it; we do not have information about the annuity conversion factor for clients who chose the full lump-sum option); no. of policies is the number of different policies for each client with this particular insurance company; and percentage 2008 is the proportion of money accumulated after 2008 that had to be withdrawn as an annuity to satisfy the minimum mandatory annuity law of 2008<sup>29</sup>.

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<sup>27</sup> as a robustness check we also look at the propensity to annuitize and the choice of full annuities and find a similar effect);

<sup>28</sup> The pricing mechanism of the annuity.

<sup>29</sup> The mandatory annuitization legislation should not have a substantial impact on our results, and it even strengthening our results. Firstly, because the regulation was enacted in 2008 regarding funds saved after this year. Our analysis is based on data from, 2009-2013 which means that most of the funds in our dataset are not restricted by the law (we control for the percentage of sums that were saved after 2008 in this company for each individual). Furthermore, we measure if a participant annuitized any amount of this accounts in our specific insurance company. If under this legislation small accounts were not annuitized, individuals may have another savings account elsewhere (implying that the small account is likely to be a part of a portfolio as we suggest).

Results for the logit model are displayed in column 1 in Table 2<sup>30</sup>. Overall, all models are significant with pseudo  $R^2$  equal to between 30% and 40%.

**[TABLE 2]**

We find that male gender,<sup>31</sup> retirement age, and macroeconomic status (year dummies) are related to the annuitization choice, but marital status does not significantly affect individual preferences. This is consistent with previous literature (e.g., Büttler and Teppa 2007).

To understand the impact of both seniority and the conversion factors, we include “purchase age” in the regression. Its coefficient is negative and significant in all the different specifications, implying that a 1-year delay in the purchase of a pension product will reduce the likelihood of choosing an annuity (this could result from the increase in the conversion factor).

Our main variables of interest are the accumulated amount variables. In specification 1, the effect is minor (by definition, it is the marginal effect of an additional NIS 1 to the accumulated amount on the propensity to annuitize).

We estimated Equation 2 with a similar specification:

$$\begin{aligned}
 y_{\text{ann}_i} = & \alpha + \beta_1 \text{male}_i + \beta_2 \text{retirement age}_i + \beta_3 \text{year dummies}'_i + \beta_4 \text{amount dummies}_i \\
 & + \beta_5 \text{marital status dummies}_i + \beta_6 \text{purchase age}_i + \beta_7 \text{no. of policies}_i \\
 & + \beta_8 \text{percentage 2008}_i + \epsilon_i
 \end{aligned}
 \tag{2}$$

This time, instead of using the accumulation size, we use a dummy variable for the accumulated amount being less than NIS 50,000 (Table 2, column 2), NIS 100,000 (Table 2,

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<sup>30</sup> For robustness we further estimated linear probability models yielded similar results.

<sup>31</sup> It should be mentioned that in Israel the annuity conversion factors are different across gender.

column 3), NIS 300,000 (Table 2, column 4), and NIS 500,000 (Table 2, column 5). In column 2 (accumulated pension amount of less than NIS 50,000), the effect is negative and significant. This implies that an individual who accumulated a relatively low amount at this insurance company (although such a retiree is likely to have more savings with other pension providers) would tend to prefer the lump sum. In columns 3–5, we report the results of similar analyses with different thresholds. For robustness we also conducted the same analysis presented in table 2 with a dependent variable measuring the proportion of sums withdrawn as an annuity out of the total savings of each individual (rather than the binary variable presented above), the coefficients of the various amount variables remain negative and significant. The results support the conjecture that when the accumulated funds are lower, the tendency to prefer an annuity is also lower.

### **Identification Strategy**

Since we have data from only one insurance company, we do not know if an individual in our sample had additional accounts with other insurance companies or pension providers. We offer and test two nonexclusive mechanisms: (1) that individuals with smaller pension accounts in our sample are those who overall saved less, and those who saved less tend to prefer the lump-sum choice; and (2) that many of the smaller accounts in our sample have little accumulated funding in this insurance company because the owner diversified her or his long-term savings via different products and providers.

To identify the determinants of the different behavior related to the size of the accumulation, we use information related to occupation. The reason we can use occupation as our identification strategy is that common practice in Israel during our investigation period was for employees to save a percentage of their salaries, matched by their employers. Furthermore, saving for a pension entitles the individual to a substantial tax benefit. Hence, it is very uncommon to

save less than the threshold in order to receive the tax benefits. For these reasons, an individual working in a high-wage occupation is expected to save more.

Next, we seek to learn whether the size of the accumulation correlates with personal characteristics. Specifically, we study a binary model in which the dependent variable is having a small amount of savings in a specific account, defined as accumulating less than NIS 100,000. Our main independent variables are personal characteristics (age at retirement, purchase age, male gender, marital status, smoking, paying an extra premium on other insurance policies for impaired health, and age difference between partners), policy characteristics (number of policies and annuity conversion factor), and macroeconomic fixed effect (year of retirement). Most of the personal characteristics are not significantly related to the size of the funds accumulated. In total, the explanatory power of the model is sufficient ( $R^2 = 18.18\%$ ) and the only variables with a significant effect are policy- and macroeconomic-related characteristics: the total number of policies, annuity conversion factor, purchase age, and retirement year. This analysis suggests that the size of the accumulated funds is not statically related to personal attributes.

For the second test, we generate a subsample of the population consisting of individuals in relatively high-wage occupations,<sup>32</sup> whom we would expect to have comparatively large accumulated savings amounts ( $N = 1,895$ ). In addition, we also generate a subsample of individuals with relatively low-wage occupations. We expect these people to have relatively low accumulated funds; hence having a small account would likely relate to economic status rather than

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<sup>32</sup> Such as managers, computer programmers, engineers, software engineers, general managers, and chief executive officers. For a full list of occupations please see the appendix.

diversification<sup>33</sup>. This subsample consists of 528 individuals.<sup>34</sup> We re-estimate equation 2 for the combined data sets of 2,423 individuals with expected high- and low-wage occupations and add a dummy variable for being in the high-expected-income group and an interaction variable for being in the high-expected-income group and having a small account (lower than NIS 50,000<sup>35</sup>). The results for the logit model are displayed in column 1 in Table 3.

### [TABLE 3]

The coefficient of the dummy variable for high income is positive and statistically significant. The interaction coefficient of high income and low accumulated amount of funds is significant and negative. This implies that individuals with high expected pension accumulations are more likely to annuitize in general and less likely to annuitize small amounts, meaning that they treat small savings accumulations differently from large accumulations<sup>36</sup>.

As an additional test, we conduct an analysis in which we match on socioeconomic attributes (while the only difference is the amount accumulated in one or more accounts at this particular insurance company). We use propensity score matching to pair selected individuals by the exact gender, retirement age, retirement year, marital status, purchase year, number of policies,

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<sup>33</sup> For example, in our settings if an individual is an engineer who earns USD 150,000 a year and saves a constant percentage of her salary (for example 18%) and we find in our dataset that she only has a small account of USD 50,000 (upon retirement) it is very likely that this account is merely a part of her portfolio. On the other hand, if a caregiver in our dataset earns a yearly salary of USD 10,000 and also saves a constant percentage of her salary (18%), a USD 50,000 account is possibly her main pension account.

<sup>34</sup> With professions such as daycare providers or housekeepers. For a full list of occupations please see the appendix.

<sup>35</sup> We increased this level for robustness. The sign of the effect remains, while at some point the result is not significant (for larger amounts).

<sup>36</sup> Income is correlated with financial literacy; hence we would expect that high wage individuals would be more likely to annuitize. We find that this is true, unless the accumulated account is small. This fact strengthens our hypothesis that mental accounting contributes to this phenomenon. Furthermore, one may argue that income is correlated with life expectancy, and indeed we find that large accounts are more likely to be annuitized. However, the results suggest that small accounts of individuals with a high-income occupation are less likely to be annuitized suggesting again that mental accounting plays a role in the decision. We will further conduct an experiment in which we control for life expectancy perceptions to validate this result.

and proportion of funds accumulated after 2008 (thus subject to the mandatory minimum annuity law<sup>37</sup>). The only difference is the amount saved at this insurance company (higher or lower than NIS 100,000). We end up with a subsample of 2,749 matched pairs (of individuals with savings of over NIS 50,000).<sup>38</sup> We estimate<sup>39</sup> the propensity score followed by an estimation of the accumulation-size effect on the tendency to choose any portion of the disbursement as an annuity. Annuity purchase is significantly higher for individuals with large accumulated funds in both the matched and unmatched samples<sup>40</sup>. Specifically, individuals in the matched sample are more likely to purchase an annuity if they have a larger sum. Our results suggest that the tendency to annuitize is driven by the size of the account and not personal characteristics. If we assume that given the long-term savings mechanism in Israel, individuals with similar characteristics should have similar total accumulated savings (though for some of them we observe only a fraction of that). This result provides additional support to the argument that small amounts are indeed likely to be part of a larger portfolio that is not observed and is treated differently by retirees.

### **Robustness Tests**

Next we conduct additional robustness tests. In particular, to overcome the concern that very small amounts might be thought of as negligible, we report new results in Table 2, column 6 for a subsample that only contains observations of retirees who accumulated over NIS 50,000 in total in pension insurance policies at this insurance company. In this subsample we find similar results: the sign of the dummy variables for accumulations lower than NIS 100,000 (between NIS 50,000 and NIS 100,000) is significant and negative, implying that for this sample as well,

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<sup>37</sup> Only for money saved after 2008.

<sup>38</sup> We used the PSMATCH2 procedure in Stata (Leuven and Sianesi, 2018) with only one match and no replacements.

<sup>39</sup> Using PSMATCH2 (Leuven and Sianesi, 2018) in Stata.

<sup>40</sup> Similar results were obtained using nearest neighbor matching.

individuals treat smaller accumulated amounts differently from how they treat large accumulations.

### **Large Accumulations and Multiple Policies in One Insurance Company**

We conduct a similar analysis to that presented in equation 2, but now we focus our examination on the behavior of individuals with high accumulated amounts (large portfolios), and those with multiple policies at one insurance company. Specifically, we include a dummy variable for accumulations higher than NIS 500,000<sup>41</sup> (the complement of the group represented in column 5 in Table 2). Results suggest that retirees with substantial funds are again more likely to annuitize.

Finally, we study a subsample of 4,433 individuals having more than one policy (and a total accumulation above the trivial threshold NIS 50,000). Results are presented in Fig. 3. We find that annuitization rates in the largest account are higher compared to the results in the smallest. We also note that annuitization rates related to the smallest account are relatively high, possibly because most individuals treat multiple accounts in one pension fund as the same account. To explore whether this behavior could be due to personal characteristics or to portfolio diversification, we turn next to our experimental framework.

### **[FIGURE 3]**

### **Internet Experimental Survey**

The major caveat concerning our data is that we observe behavior related to only one provider. To overcome this limitation, we conducted an Internet experimental survey aimed at controlling the information and, ultimately, eliciting a decision in a task for which we can control

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<sup>41</sup> This threshold was chosen in comparison to public information published by Old Mivtachim, the largest Israeli “old pension fund” (historically, members of these funds usually did not have other pension accounts). As of December 2017, the mean accumulation of individuals aged 60–64 insured in this fund was NIS 749,622.



the size and composition of the entire pension portfolio. We carried out an Internet experimental survey <sup>42</sup> of 1,971 Israeli residents aged 18–79 years ( $n = 390$  in condition 1;  $n = 391$  in condition 2;  $n = 394$  in condition 3;  $n = 398$  in condition 4;  $n = 398$  in condition 5; mean age = 39.1 years; 48.7% male) in October 2018 and February 2019. Regarding income, 13.6% reported a very low income, and 39% reported a high income.

The main task each participant faced was to split (virtual) accumulated funds between an annuity that would pay every period (until the end of life) and a lump sum. The control group (condition 1) was told that they had a single account with a total of NIS 2,000,000. The second group (condition 2) was told that their pension savings were managed in two accounts, a small account of NIS 30,000 and a large account of NIS 1,970,000. The third group (condition 3) faced the same task, only this time the small account consisted of NIS 100,000 and the large account was NIS 1,900,000. The fourth group (condition 4) was told they had a small account of NIS 500,000 and a large account of NIS 1,500,000, and participants in the fifth group (condition 5) were told they had two equal accounts of NIS 1,000,000 each. Given that the total in all treatments was NIS 2,000,000, we assume that if individuals cared only about the total, the division should not matter to the overall decision. Respondents were randomly assigned to the five conditions; hence our samples are well-balanced in terms of gender, age, income, and other demographic variables.

Our findings are consistent with the results we report above. Regarding the larger account, there is no significant difference in the proportion of lump-sum withdrawals across the five

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<sup>42</sup> The Internet experimental survey was sampled (representatively) by Geocartography from an online panel of about 35,000 voluntarily registered potential participants with a wide residential age distribution. Our sample is similar with to CBS, Population Census (2017). For instance, 48.7% percent of our sample are male (48.9% in the population census). 60.2% of men are marries (56% in the population census) and 54% of women are married (same as the population census).

conditions. As clearly demonstrated in Fig. 4, whether the large account consists of NIS 2,000,000, NIS 1,970,000, NIS 1,900,000, NIS 1,500,000, or NIS 1,000,000, the average lump-sum withdrawal is about 30%.<sup>43</sup> However, the propensity to choose a lump sum for any part of the small accounts was much higher. For the NIS 100,000 account, an average of 57.6% of the funds were cashed out (taken as a lump sum). For the NIS 30,000 account, we document an average lump-sum withdrawal of 71.2%. Finally, for the NIS 500,000 account we find an average lump-sum cash-out of 43.6%, and in the equal accounts condition this decreased to 37.9%. As further presented in Fig. 4b, c, we find that the composition of the accounts does matter. An unequal diversification of the funds with a large sum in one account and a relatively small amount in the other yields choosing lower lump-sum withdrawals from the total accumulation (the total amount of money in both funds). In these cases, we also observe higher volatility of the chosen lump sum amount. When the two accounts are relatively large and the amount is more equal, participants withdraw higher lump-sum amounts, on average. Fig. 5 presents kernel density plots for the control group (condition 1) compared to conditions 2–5, both for the entire sample and a subgroup of participants aged 50 and above. A Kolmogorov–Smirnov test of the hypothesis that the empirical distributions for the control condition with one account and each of the two-account conditions comes from the same population distribution rejects the null hypothesis (all  $p$  values are lower than 0.05).

For robustness we tested the results of a logit model in which the dependent variable is withdrawing only a lump sum ('full lump-sum amount'), and also a logit model in which the dependent variable indicates choosing the full annuitization option. Interestingly, these robustness

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<sup>43</sup> Lump-sum withdrawal in all conditions was the following: condition 1 = 32.3%; condition 2 = 32.9%; condition 3 = 30.1%; condition 4 = 32.9%; and condition 5 = 32.3% (we should note that it was 37.9% in the second account, which was equal). The difference between the ratios is not statistically significant.

tests suggest a significant difference in the tails of the distribution. Specifically, for the full lump-sum specification, we find that the propensity to fully withdraw both accounts is significantly higher in cases where there are two accounts with funds split unevenly, compared to the control group (one account), while our results suggest that the propensity to fully annuitize is lower with the existence of a relatively small account (either 30,000 or 100,000, i.e. an un-equal diversification).<sup>44</sup>

These findings suggest that when individuals hold multiple accounts, mental accounting may affect not only the decision regarding the small account, but also the decision regarding the total amount saved.

**[FIGURE 4]**

**[FIGURE 5]**

Since our survey was conducted among a representative sample and our conjecture is that experts may be less affected by the distribution across funds, we also conducted a second robustness survey in which the participants were financial experts. To do so, we asked finance professors as well as senior managers of pension funds in Israel<sup>45</sup> to participate in our survey experiment. Specifically, we asked them to split (virtual) accumulated funds between an annuity that would pay every period (until the end of life) and a lump sum. The control group (condition 1) was told that they had a single account with an accumulated total of NIS 2,000,000. The second group (condition 2) was told that their pension savings were managed in two accounts, a small account of NIS 100,000 and a large account of NIS 1,900,000. Given that sample consists of 61

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<sup>44</sup> Our robustness tests also show that individuals with high self-reported financial literacy are more likely to withdraw lump-sum amounts (possibly due to confidence in their ability to perform other investments).

<sup>45</sup> Senior managers are chief executive officers or vice presidents of pension funds and insurance corporations, either in the present or in the past.

experts ( $n_1 = 27$  in condition 1 and  $n_2 = 34$  in condition 2). As our sample is relatively small, we cannot overstate the results; nevertheless, the distribution of the results is not significantly different for both conditions (see Fig. 6). This suggests that highly informed and trained individuals think about the total sum of money involved, and they are less affected by its distribution across accounts.

## [FIGURE 6]

### 6. Laboratory Experiment

#### 6.1. Design Details

The laboratory experiment included two rounds of a computerized task that involved the distribution of funds between an annuity and a lump sum (where the conversion factor was set to the actuarially fair value of 200), in a setting where the consumption and longevity were uncertain yet controlled via customized software. The design followed the outline of Hurwitz, Sade and Winter (2020). The participants were students of the College of Management Academic Studies, Israel,<sup>46</sup> and were first given verbal instructions and then asked to read a scenario in which they learned they were just before retirement and had so far saved ZUZ<sup>47</sup> 2,000,000. Participants were then told that a computer would draw their life expectancy from a set ranging from 0 to 400 months with an average of 200 months.<sup>48</sup> They were notified that the outcome of the draw would only be revealed after they made their choice. Therefore, they did not know the exact amount they needed before choosing an annuity. Participants were given one example of the task to confirm that they

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<sup>46</sup> Participants were recruited through advertisements at the College and emails from the academic staff.

<sup>47</sup> ZUZ was a virtual currency that was converted (for payment into NIS at a ratio of ZUZ 50,000 to NIS 1).

<sup>48</sup> We designed the experiment in such a way that a risk-neutral individual would be indifferent between the annuity and the lump sum for each of the consumption values (given our aim is to focus on the effect of the distribution across accounts). To find the optimal choice, one should assume a specific structure of risk preferences, which we do not assume. We assume that since our participants were randomly assigned, there is no significant difference in the risk aversion among the different conditions and groups.

understood the instructions. They also provided demographic details before proceeding with the task.

Participants ( $N=61$ ) were randomly assigned to one of two conditions ( $n=30$  in condition 1;  $n=31$  in condition 2). Condition 1 was the “one account” situation, in which the ZUZ 2,000,000 was in one account; participants received no additional information beyond what we described above. In condition 2, participants were told that they had saved via two accounts, one with ZUZ 100,000 and the other with ZUZ 1,900,000. Participants in both conditions were told that their monthly consumption would be ZUZ 3,000, 4,000, or 5,000 (evenly distributed). The participants’ task was to decide how to split their (virtual) accumulated funds between (a) an annuity that would pay every period according to the realized longevity and (b) a lump sum. In the two-accounts condition (condition 2), participants faced the decision for each account. Throughout the experiment, we calculated the monthly balance in the participants’ account according to their choices and the realization of the variables. In the case of a surplus, it was accumulated each month and in the case of a deficit it was taken from the lump sum, if possible.<sup>49</sup>

The participants received a show-up fee of NIS 30 (equivalent to the hourly minimum wage in Israel) and NIS 20 in addition if they had no deficit in their account at the end of the experiment. This was designed to simulate the real-life state in which individuals who perceive annuities as a consumption tool are more likely to purchase them (Brown et al. 2008). Moreover, any monthly surplus or a lump sum not used for consumption was added to participants’ payments (as described

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<sup>49</sup> The decision made in our laboratory experiment takes into account some important real-life considerations related to the withdrawal phase, such as longevity risk (uncertainty the periods), financial shocks (uncertainty about expected consumption), and bequest motives (the payment mechanism includes the cumulative difference between income and expenses). However, the experiment is still abstract and does not consider some other real-life considerations, such as large financial shocks early in retirement and etc. Nevertheless, as the aim of the experiment is not to explain the reasons for low demand in many annuity markets, but rather to study the consequences of holding multiple accounts, and since the above considerations were identical in both conditions, the abstraction does not affect the external validity of our results.

to participants in detail at the beginning of the experiment). The aim of this part of the compensation scheme was for students to consider bequest motives known to influence annuity choices (Friedman and Warshawsky 1990; Inkmann et al. 2010). Given that being an elderly person with no income or savings is a very undesirable outcome, participants were fined for consuming all their funds, and if the annuity (and the remaining of the lump sum withdrawal) was insufficient for consumption costs, they received only the show-up fee. Each participant took part in the experiment twice (same condition), to test for potential learning effects.

## **6.2. Results**

Results of the first round are presented in Fig. 7 (the results of the second round are very similar). They suggest that, in the case of two accounts, participants were more likely to withdraw (cash out) from the small account (29%) than the large account (16.9%).

### **[FIGURE 7]**

Further, results are also consistent with the results of our Internet experimental surveys related to the effect of having multiple accounts on withdrawals. In this case (where the distribution of funds is 100,000 in the small account and 1,900,000 in the large one), total cash withdrawal was ZUZ 349,000 (17% of the total accumulation), compared to ZUZ 826,666 (41% of the total) in the control condition (one account).

With regard to the distribution of withdrawals, Fig. 7d presents the distribution of amounts withdrawn from the large accounts (either ZUZ 2,000,000 in the control condition 1 or ZUZ 1,900,000 in the two-accounts condition 2). It is interesting to note that the distribution of chosen cash-outs moved to the left, and that in the two-accounts condition, 20% of participants chose not to cash out the large account at all (compared to 3% in the control condition). It is reassuring that our experimental results resemble our Internet experimental survey results. Both suggest that the

composition of portfolios consisting of multiple accounts matters by affecting the propensity to cash out or annuitize the funds.

## **7. Conclusions**

This paper tests whether holding multiple savings accounts affects retirement payout decisions. Specifically, we examine the annuitization decisions of retirees in Israel who have had a pension insurance product at a leading Israeli insurance company. Our investigation relies on a unique and very detailed proprietary data set from an insurance company that contains, in addition to information about annuitization decisions upon retirement, a rich set of sociodemographic parameters, including information on occupation. We document a significant and positive effect of the size of the accumulated funds on the decision to annuitize: the smaller (larger) the accumulated sum of money in the pension account, the lower (higher) the propensity to annuitize upon retirement. In a further set of internet and lab experiments, we again show that the very existence of a small account within a portfolio may in fact alter annuitization rates related to that total amount. In other words, diversification across accounts may lead to different decisions and in turn, different financial outcomes for both individuals and financial institutions.

Our results have important policy implications for ALM at financial institutions. These institutions are expected to forecast both the propensity to annuitize and the longevity risk embedded in their portfolios. Systematic individual biases may influence choices and as a result may also have consequences related to the future reserves needed for the stability of annuity providers.

While this is not be the sole explanation of annuitization choice, our findings suggest that mental accounting plays a role by causing retirees to perceive smaller and larger pension accounts differently, and hence leading them to make different decisions about disbursements. We

recognize that mental accounting is very relevant to the valuation of the costs and benefits associated with multiple retirement savings accounts across several providers and may be considered by financial institutions when developing financial technology applications that can overcome the documented tendencies (e.g., an app that aggregates the account information and presents the overall accumulations before the annuitization decision, and vice versa, depending on needs and desires).

One may argue that some individuals are fully aware of lacking self-control (O'Donoghue and Rabin 1999), hence the fact that they hold multiple savings accounts is an intended mechanism, aimed at encouraging financial discipline (Zhang and Sussman 2018). Specifically, saving via multiple accounts may allow in the future to withdraw the small as lump sum while the other, larger account, is designated to annuitization. This insight may be used by financial institutions by suggesting opening more than one savings account, each designated to a different goal. Further research is required, however, to fully understand the consequences of such a suggestion.

Our results can also help in the design of regulatory interventions. In future research, we hope to study the consequences and implications of first presenting retirees with their total accumulation and discussing their various retirement needs, before they make the annuitization decisions.



## **Conflict-of-interest disclosure statement**

### **Orly Sade**

In addition to the financial support she received for this project (Think Forward Initiative (TFI) and the Kruger Center at the Hebrew University), Orly Sade received several research grants related to other research projects – none of these grants create conflict of interest with this project. Orly Sade is a board member at Clal Insurance in Israel, this does not create any conflict of interest with this paper (the data was obtained from a different insurance company prior to the board position). This paper received IRB approval.

### **Abigail Hurwitz**

In addition to the financial support she received for this project (Think Forward Initiative (TFI) the German-Israeli Foundation for Scientific Research and Development (GIF) and from the School for Business Administration at the College of Management Academic Studies, Israel), Abigail Hurwitz received several research grants related to other research projects – none of these grants create conflict of interest with this project. This paper received IRB approval.

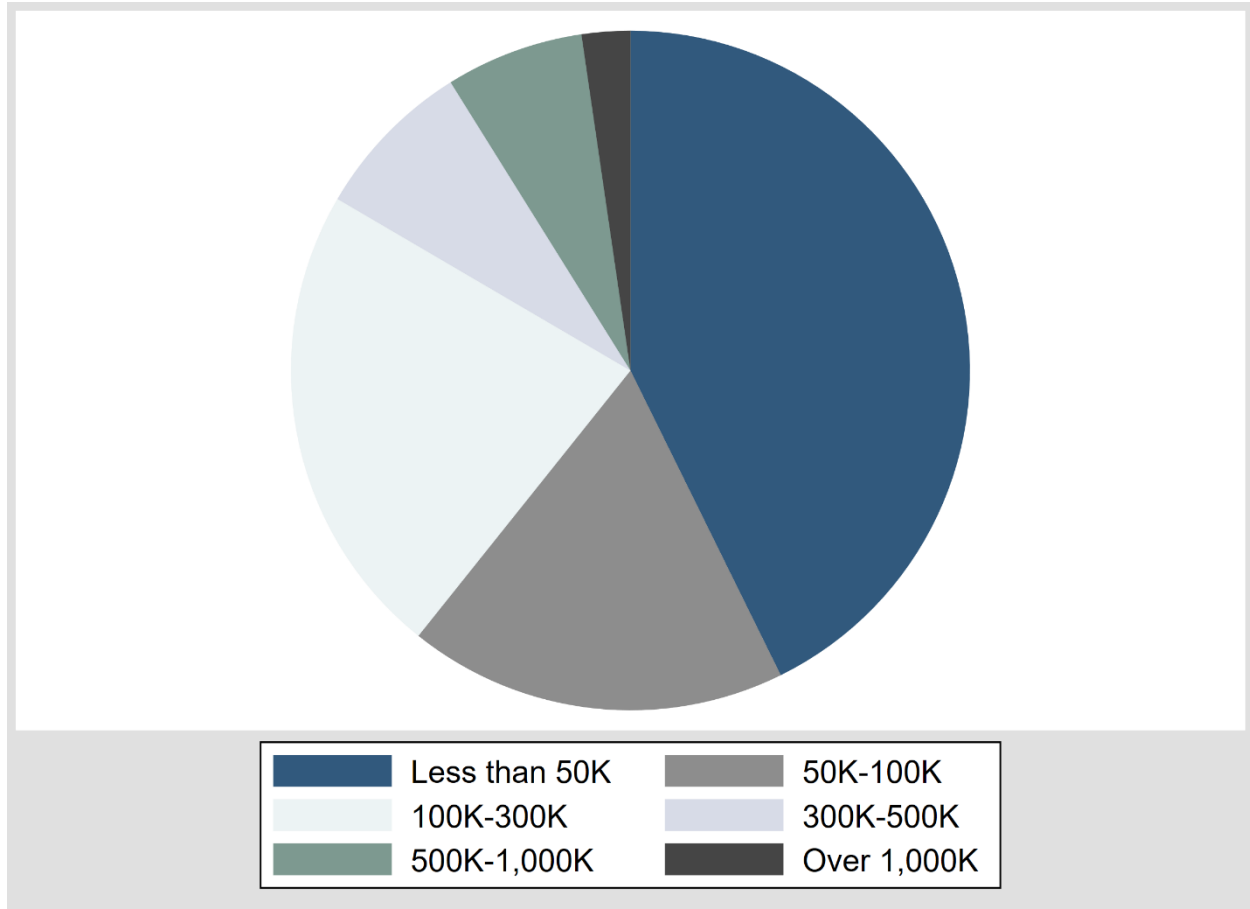
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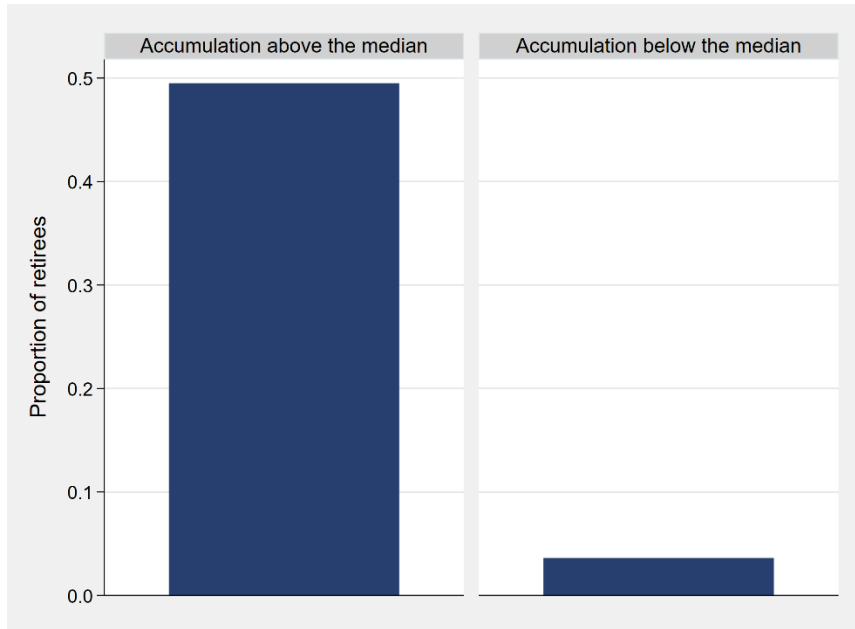
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**Figure 1.** Accumulation distribution by number of clients. Amounts are in new Israeli shekels.



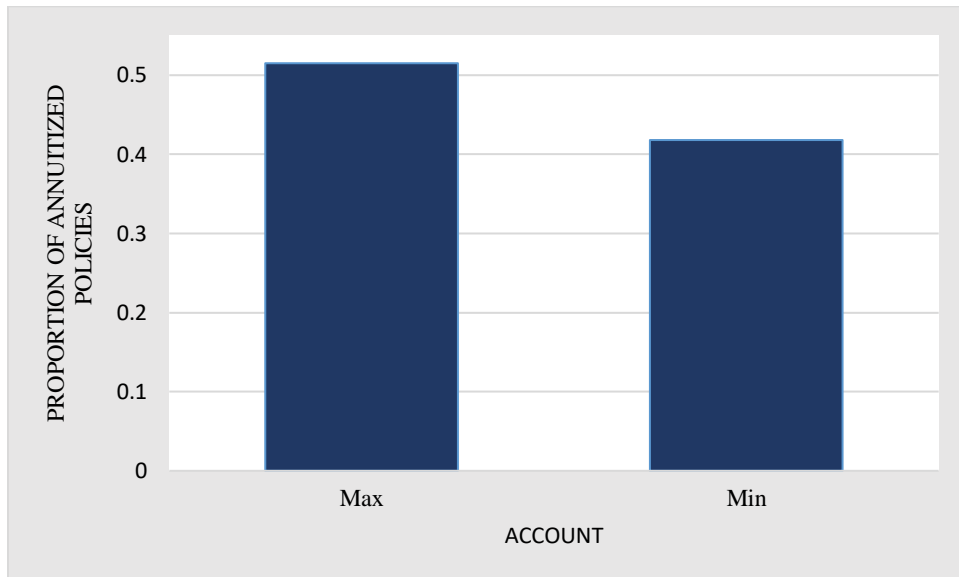
Note: the number of clients in our sample declines with the increase in accumulated funds.

**Figure 2.** Annuitization choices by accumulation size



Note: Proportion of retirees who chose to annuitize any portion of their accumulated funds, separately for those who had saved more than the median and those who had saved less than the median amount.

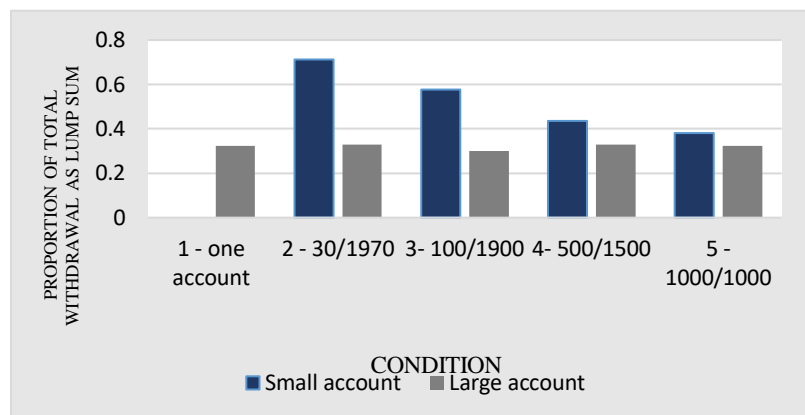
**Figure 3.** Proportion of annuitized policies for retirees with multiple accounts and total accumulation above NIS 50,000.



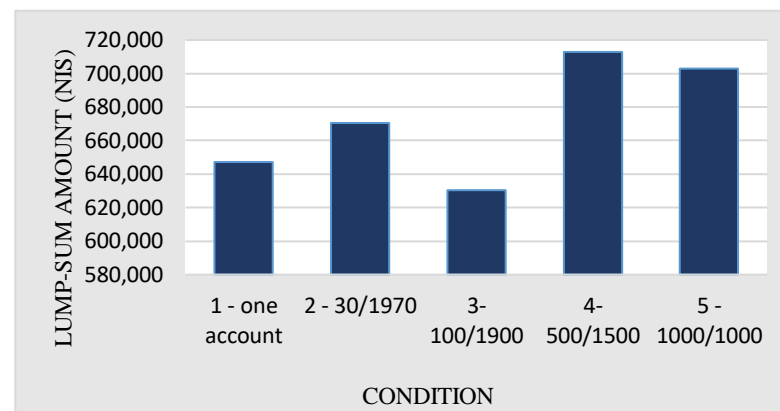
Note: subsample of 4,433 individuals having more than one policy in the same insurance corporation. Annuitization rates in the largest account are higher compared to the results in the smallest.

**Figure 4.** Online experiment results

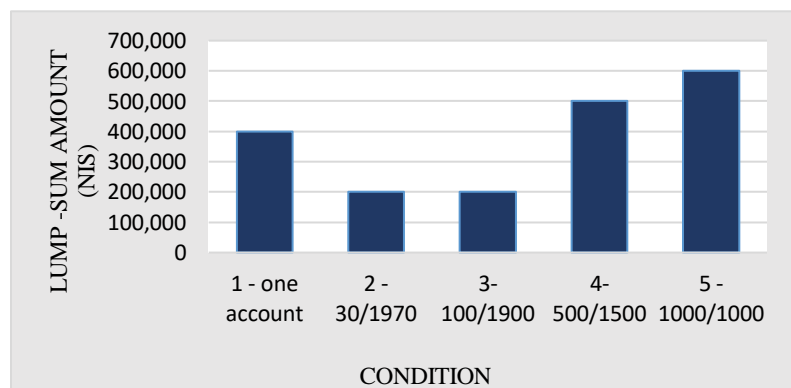
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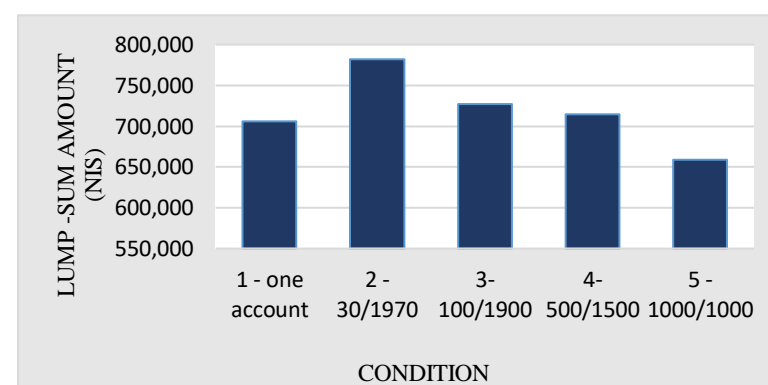
(b)



(c)



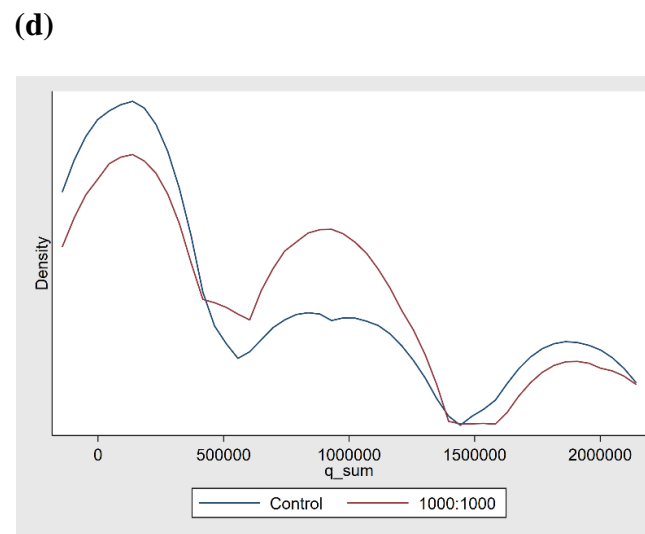
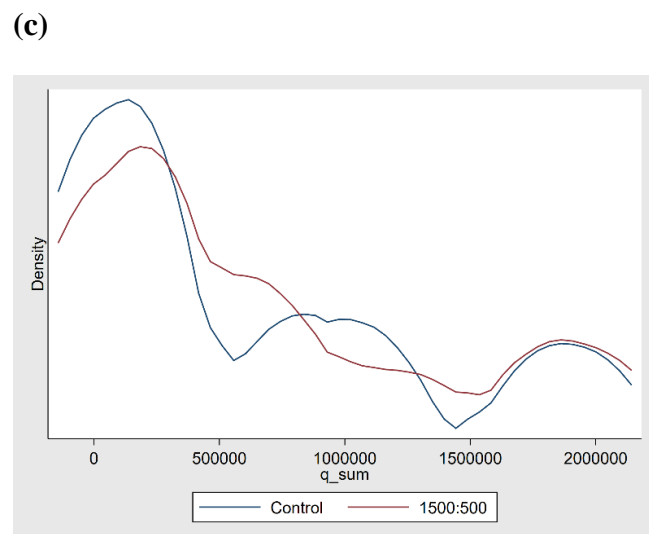
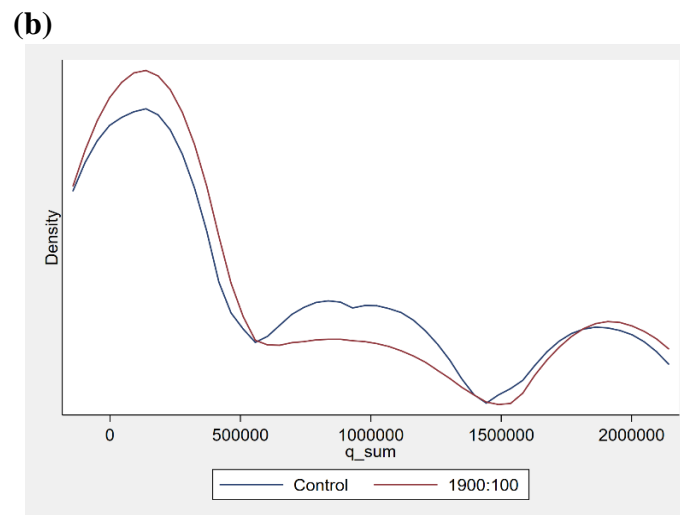
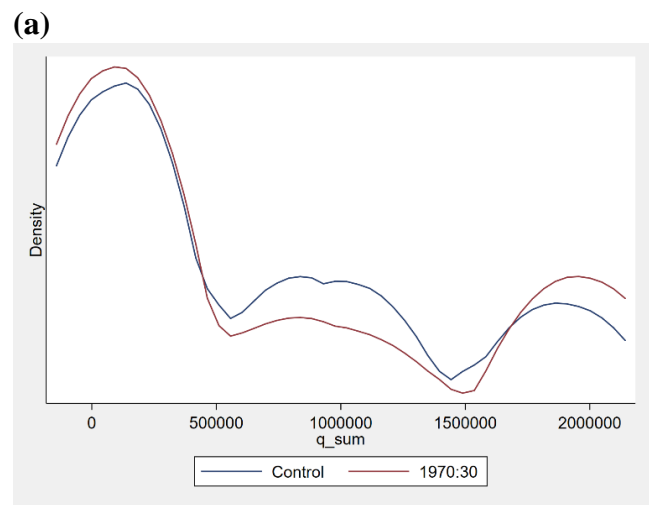
(d)

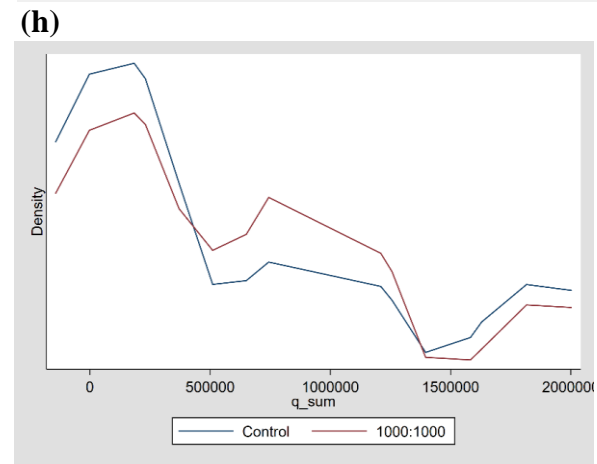
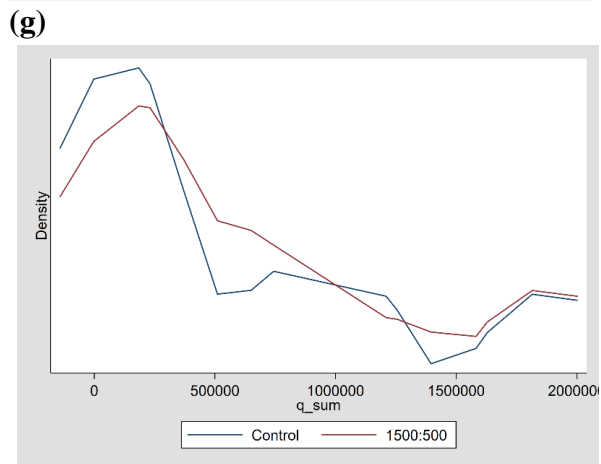
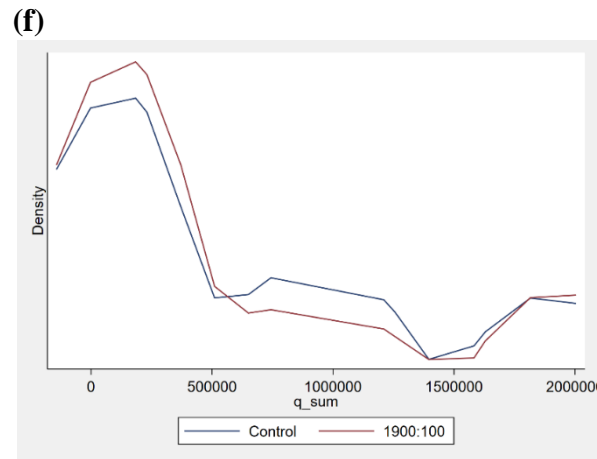
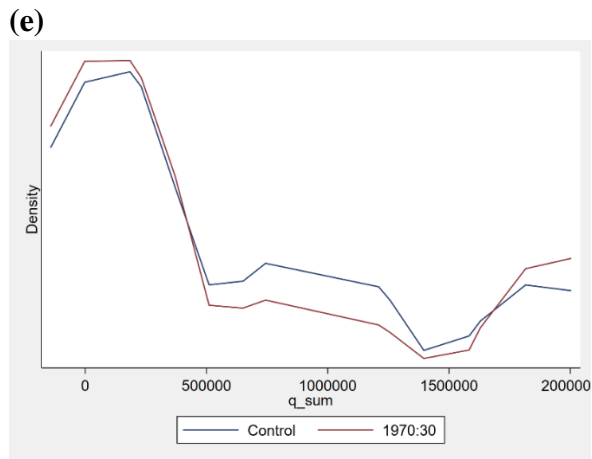


Note: (a) Proportion of total accumulation withdrawn as a lump sum, separately for small and large accounts. (b) Mean lump sum chosen from the total amount. (c) Median lump sum chosen from the total amount. (d) Standard deviation of the lump sum chosen from the total amount. Condition 1: one account, NIS 2,000,000; condition 2: two accounts, NIS 30,000 and NIS 1,970,000; condition 3: two accounts, NIS 100,000 and NIS 1,900,000; condition 4: two accounts, 500,000 and 1,500,000; condition 5: two accounts, NIS 1,000,000 each.



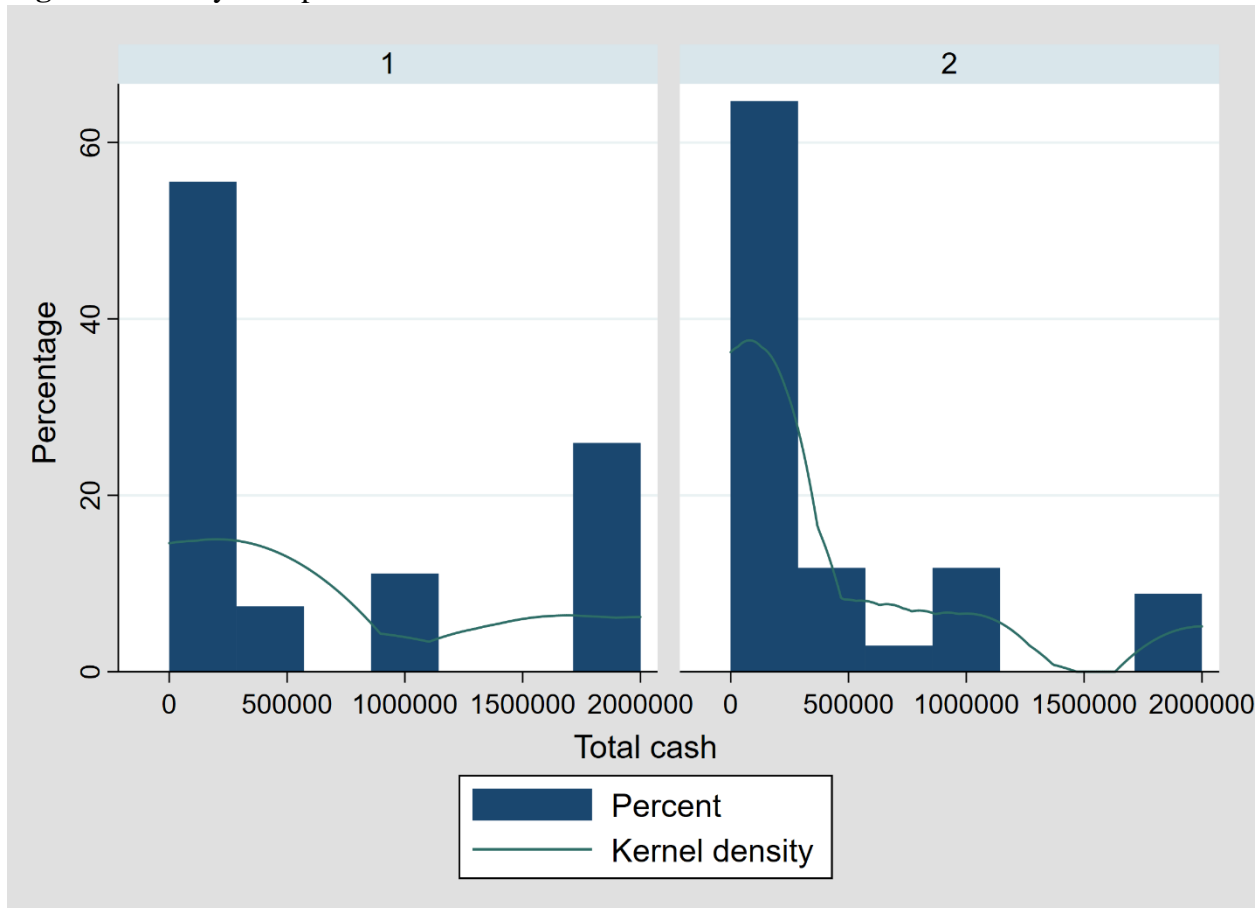
**Figure 5.** Online experiment - Kernel densities





Note: **(a)** Condition 1 and condition 2 (for full sample). **(b)** Condition 1 and condition 3 (for full sample). **(c)** Condition 1 and condition 4 (for full sample). **(d)** Condition 1 and condition 5 (for full sample). **(e)** Condition 1 and condition 2 (population aged 50+). **(f)** Condition 1 and condition 3 (population aged 50+). **(g)** Condition 1 and condition 4 (population aged 50+). **(h)** Condition 1 and condition 5 (population aged 50+). Condition 1: one account, NIS 2,000,000; condition 2: two accounts, NIS 30,000 and NIS 1,970,000; condition 3: two accounts, NIS 100,000 and NIS 1,900,000; condition 4: two accounts, 500,000 and 1,500,000; condition 5: two accounts, NIS 1,000,000 each.

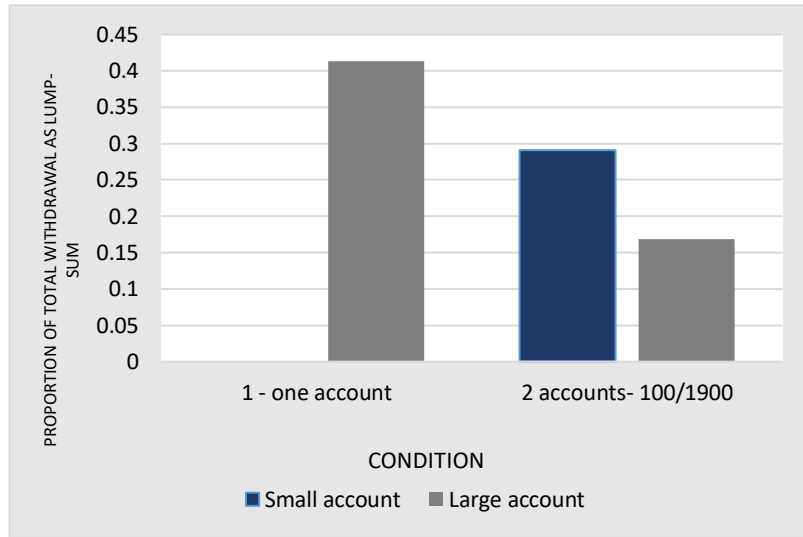
**Figure 6.** Survey of experts



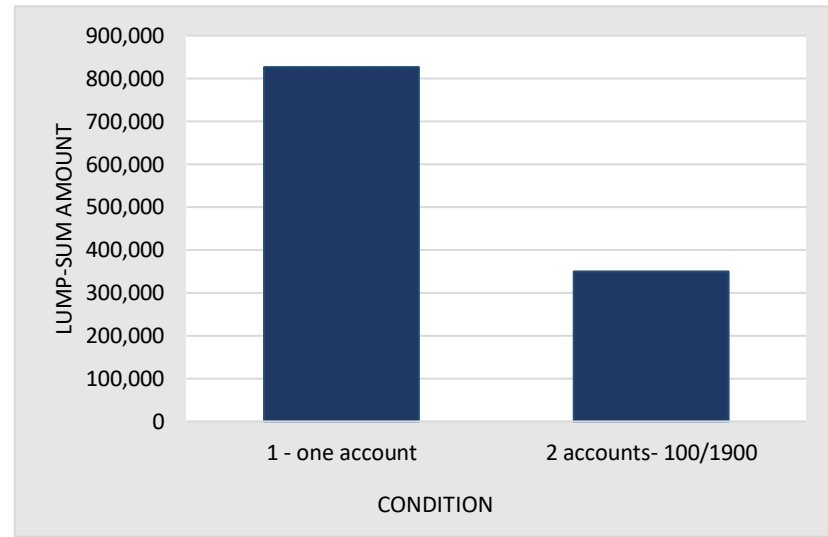
Note: Left: Condition 1 (one account with NIS 2,000,000). Right: Condition 2 (two accounts with NIS 1,970,000 and 30,000).

**Figure 7.** Lab experiment results

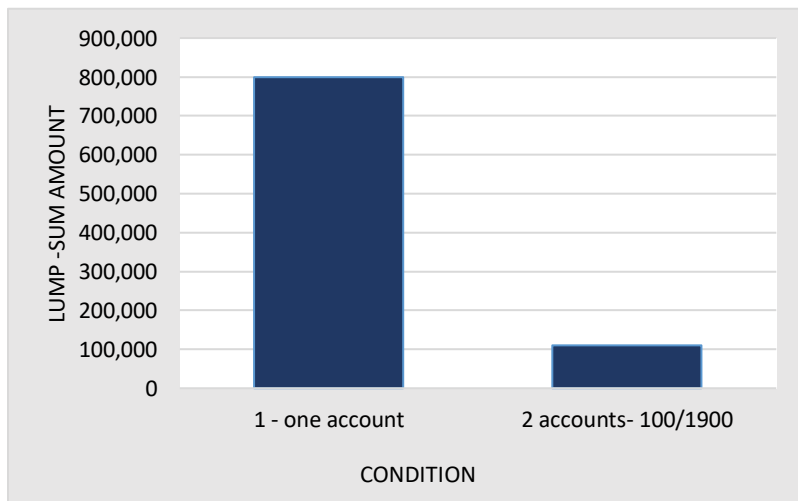
(a)



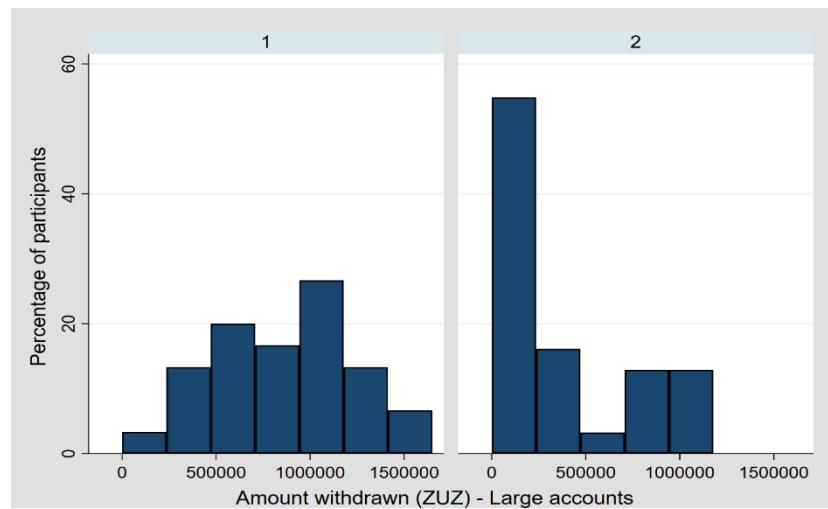
(b)



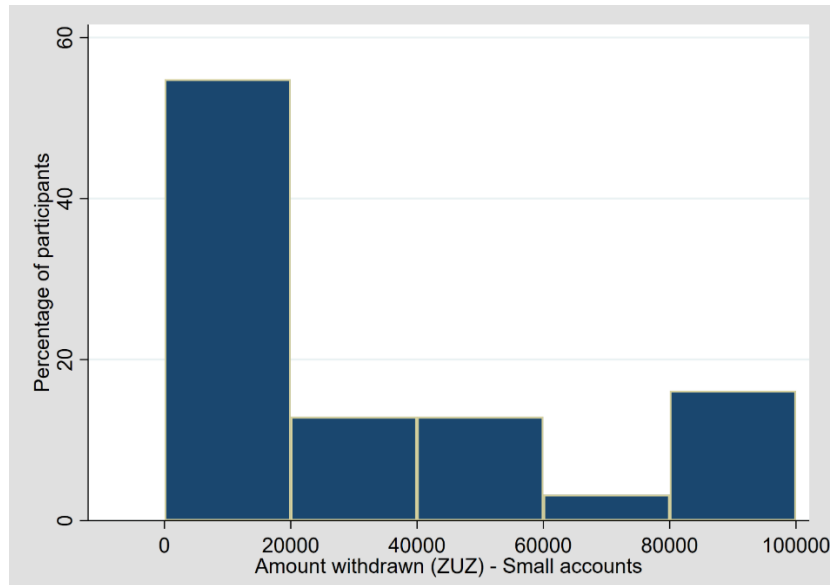
(c)



(d)



(e)



**(a)** Proportion of total accumulation withdrawn as a lump sum in the experiment, separately for small and large accounts. **(b)** Mean lump sum of the total amount withdrawn. **(c)** Median lump sum of the total amount withdrawn. **(d)** Distribution of amounts withdrawn from the single large account (condition 1, left) and the larger of two accounts (condition 2, right). **(e)** Distribution of amounts withdrawn from the small account. Condition 1: One account, ZUZ 2,000,000; condition 2: two accounts, ZUZ 100,000 and ZUZ 1,900,000. ZUZ = experimental currency.

**Table 1. Descriptive statistics of the data**

Variable	<i>N</i>	Mean	<i>SD</i>	% of total sample
Individuals in sample	15,293			
Accumulated funds (NIS)		173,742.3	327,496.1	
Retirement age (years)		65.9	3.9	
Male	7,401			48.4
Marital status				
Divorced	1,364			8.9
Widowed	720			4.7
Married	8,731			57.1
Annuitization				
Retirees choosing annuity	4,084			26.7
Monthly annuity		1,902.5	1,958.9	
Annuity conversion factor		13.5	2.07	

*Note:* Accumulated funds refers to the total funds accumulated by each retiree. Retirees choosing annuity are retirees who chose any portion of disbursement as an annuity. Monthly annuity is the monthly annuity for retirees who chose to annuitize. Annuity conversion factor (in yearly terms) is the conversion rate from lump-sum to annuity for retirees who chose to annuitize. NIS = New Israeli shekels.

**Table 2. Annuity decision regression. Dependent variable: Choosing any part of disbursement as an annuity (rather than the full lump-sum choice)**

Variable	Basic regression with annuity amount	Basic regression with dummy for accumulated funds less than NIS 50,000	Basic regression with dummy for accumulated funds less than NIS 100,000	Basic regression with dummy for accumulated funds less than NIS 300,000	Basic regression with dummy for accumulated funds less than NIS 500,000	Basic regression with dummy for accumulated funds between NIS 50,000 <sup>a</sup> and NIS 99,999
	(1)	(2)	(3)	(4)	(5)	(6)
	Logit coefficient	Logit coefficient	Logit coefficient	Logit coefficient	Logit coefficient	Logit coefficient
Gender	0.113** (0.0571)	0.261*** (0.0563)	0.205*** (0.0589)	0.205*** (0.0563)	0.260*** (0.0541)	0.196*** (0.0623)
Retirement age	0.173*** (0.00885)	0.195*** (0.00888)	0.169*** (0.00921)	0.193*** (0.00863)	0.216*** (0.00837)	0.154*** (0.0101)
Accumulated amount variables						
Total amount	5.05e-06*** (1.65e-07)					
Less than NIS 50,000		-2.857*** (0.0905)				
Less than NIS 100,000			-2.459*** (0.0596)			-1.663*** (0.0677)
Less than NIS 300,000				-2.100*** (0.0678)		
Less than NIS 500,000					-1.882*** (0.0937)	
Marital status						
Divorced	-0.0566 (0.161)	-0.0541 (0.164)	-0.129 (0.171)	-0.0383 (0.161)	-0.120 (0.154)	-0.149 (0.184)
Widowed	-0.0448 (0.174)	-0.0963 (0.178)	-0.100 (0.186)	-0.00507 (0.175)	-0.0697 (0.167)	-0.186 (0.200)
Married	-0.121	-0.127	-0.178	-0.110	-0.168	-0.220

Variable	Basic regression with annuity amount	Basic regression with dummy for accumulated funds less than NIS 50,000	Basic regression with dummy for accumulated funds less than NIS 100,000	Basic regression with dummy for accumulated funds less than NIS 300,000	Basic regression with dummy for accumulated funds less than NIS 500,000	Basic regression with dummy for accumulated funds between NIS 50,000 <sup>a</sup> and NIS 99,999
	(1)	(2)	(3)	(4)	(5)	(6)
	Logit coefficient	Logit coefficient	Logit coefficient	Logit coefficient	Logit coefficient	Logit coefficient
	t					
Unknown	(0.147) -2.979***	(0.150) -3.016***	(0.157) -3.059***	(0.148) -2.975***	(0.141) -3.100***	(0.169) -3.035***
Purchase age	(0.174) -0.165***	(0.173) -0.184***	(0.179) -0.166***	(0.172) -0.177***	(0.167) -0.195***	(0.189) -0.169***
No. of policies	(0.00581) 0.123***	(0.00598) 0.200***	(0.00604) 0.133***	(0.00568) 0.214***	(0.00554) 0.298***	(0.00692) 0.104***
Percentage post-2008	(0.0152) 1.804***	(0.0131) 1.844***	(0.0136) 1.521***	(0.0144) 1.907***	(0.0141) 2.023***	(0.0133) 1.863***
Year 2009	(0.141) 0.807***	(0.157) 0.680***	(0.153) 0.730***	(0.138) 0.762***	(0.136) 0.735***	(0.193) 0.708***
Year 2010	(0.0847) 0.513***	(0.0872) 0.401***	(0.0890) 0.418***	(0.0834) 0.484***	(0.0808) 0.513***	(0.0993) 0.394***
Year 2011	(0.0820) 0.241***	(0.0822) 0.129*	(0.0847) 0.161**	(0.0810) 0.256***	(0.0778) 0.260***	(0.0921) 0.113
Year 2012	(0.0758) 0.205***	(0.0752) 0.123*	(0.0779) 0.137*	(0.0743) 0.197***	(0.0717) 0.201***	(0.0835) 0.0854
Constant	(0.0747) -5.546***	(0.0739) -4.733***	(0.0764) -3.127***	(0.0734) -3.969***	(0.0706) -4.774***	(0.0819) -1.868***
Observations	(0.491) 15,293	(0.489) 15,293	(0.515) 15,293	(0.489) 15,293	(0.478) 15,293	(0.553) 8,759
Pseudo R <sup>2</sup>	0.4035	0.4180	0.4365	0.3856	0.3520	0.3059

*Note.* Standard errors in parentheses. Dependent variable,  $y_{ann}$ , is an indicator variable for choosing any part of the disbursement as an annuity (rather than the full lump-sum choice). Main explanatory variables are gender, retirement age, year total accumulation amount (total amount), marital status, purchase age, number of policies, and the percentage of accumulation saved after 2008. Specifications 1–5 are for all retirees in the data ( $N = 15,293$ ). Specification 6 is for retirees with accumulated funds of over NIS 50,000 ( $N = 8,759$ ). NIS = New Israeli shekels.

<sup>a</sup> Sums lower than NIS 50,000 were excluded from this regression.

\*\*\*  $p < 0.01$ . \*\*  $p < 0.05$ . \*  $p < 0.1$ .



**Table 3. Annuity decision regression. Dependent variable: Choosing any part of disbursement as an annuity (rather than the full lump-sum choice). Low- vs. high-wage occupations**

Variable	Low- vs. high-wage occupations
	Logit coefficient
Gender	0.135 (0.261)
Retirement age	0.159*** (0.0302)
High-wage occupation (=1)	1.439** (0.562)
Accumulated amount variables	
Less than NIS 50,000	-0.995 (0.781)
High wage * Less than NIS 100,000	-1.831** (0.912)
Marital status	
Divorced	0.509 (1.159)
Widowed	1.592 (1.135)
Married	1.403 (1.094)
Unknown	-1.240 (1.146)
Purchase age	-0.154*** (0.0202)
No. of policies	0.148*** (0.0339)
Percentage post-2008	2.122*** (0.610)
Year 2009	2.385*** (0.414)
Year 2010	2.193*** (0.402)
Year 2011	1.551*** (0.401)
Year 2012	1.655*** (0.395)
Constant	-9.466*** (2.016)
Observations	2,423
Pseudo $R^2$	0.3359

*Note.* Standard errors in parentheses. Dependent variable,  $y_{ann}$ , is an indicator variable for choosing any part of the disbursement as an annuity (rather than the full lump-sum choice). Individuals with high-wage occupations are more likely to annuitize, and more likely to cash out accumulated amounts lower than NIS 50,000. \*\*\*  $p < 0.01$ . \*\*  $p < 0.05$ . \*  $p < 0.1$ .

**Appendix**  
**High-income Wage Occupations**

Accountant  
Attorney  
Bank Teller  
Bookkeeper  
Business Development Manager  
Chemical Engineer  
Chief Executive Officer  
Chief Financial Officer/Director of Finance  
Civil/Construction Engineer  
Civil/Construction Practical Engineer  
Computer Engineer  
Computer Programmer  
Computer Systems Analyst/ Information Technology (IT) Analyst  
Dental Technician  
Dentist  
Department Manager  
Economist  
Electrical Engineer  
Electronics Engineer  
Electronics Practical Engineer  
Engineer  
General Manager  
General Surgeon  
Hardware Engineer  
Human Resources Manager/Director  
Insurance Broker  
IT Manger/Chief Information Officer (CIO)  
Journalist  
Lecturer  
Manager  
Marketing Associate/Analyst  
Marketing Manager/ Chief Marketing Officer  
Mechanical Engineer  
Mechanical Practical Engineer  
Operations Manager/Chief Operating Officer  
Owner/Business Owner  
Pharmacist  
Physician/General Practitioner  
Product Manager/VP Product  
Production Manager  
Programmer  
Programmer/Developer  
Project Manager  
Sales Manager/Vice President (VP) Sales/Chief Revenue Officer

Software Engineer  
Software Tester/Quality Assurance Analyst  
Vice President

**Low-income Wage Occupations**

Childcare preschooler provider  
Cleaner/ House cleaner  
Gardener  
Kindergarten teacher  
Kitchen worker  
Nanny  
Nursing caregiver